Chemistry & Materials Science Environmental Services

Chemistry & Materials Science Environmental Services (CES) is an integrated sample management and analytical laboratory organization managed within the Chemistry and Materials Science Directorate. Its mission is to provide chemical and radiochemical characterization of environmental samples, which is integral to LLNL's commitment to environmental stewardship.

The organization operates under a fixed price contract to perform analyses for LLNL's Environmental Protection Department (EPD), our primary customer. This contract includes the characterization of wastes that require regulatory analyses and environmental monitoring for radionuclides. Using both CES and outside commercial laboratories, we can perform analyses for more than 30 inorganics and radionuclides and 225 organics in a variety of sample types.

The CES laboratory also houses techniques that are available for use outside the scope of the EPD contract. We receive non-overhead funds (direct charge) for the characterization of samples such as those from the HWM Waste Treatment Facility and the decontamination of buildings and equipment.

CES is certified by the California Department of Health Services (DHS) for the proper characterization of wastewater, hazardous and mixed waste, and environmental samples. CES also analyzes ground water, air, soil, vegetation, wine, and other local foodstuffs for various radioactive isotopes of interest at trace levels for the LLNL environmental monitoring program, in addition to being part of the site emergency response system.

Services

The CES laboratory and organization support LLNL's environmental protection, waste management, monitoring, and remediation programs. CES has active feedback mechanisms in place to ensure customer satisfaction and timely, useful, high-quality, cost-effective analytical data. CES provides full service to customers.

CES works closely with customers to focus on their needs. Our scientists serve as customer liaisons, first to determine their analysis needs and then to identify the source that best meets those needs, all the while keeping the client's priorities foremost in our selection of analytical laboratories. We monitor the performance of both internal and external analytical laboratories through the use of blind QC samples and participate in nationwide or international intercomparisons.

The CES goal is to be the Lab's lab (LLNL's contract regulatory analysis laboratory). In 1995, CES will analyze approximately 5000 samples requiring 22,000 regulatory (certified) analyses to support LLNL environmental characterization efforts.

Organization

CES is divided into two groups, the Sample Management Group and the Laboratory Operations Group.

The Sample Management Group is responsible for receiving and handling samples, tests related to safety measures associated with physical

Services Include

- Consultation with customers to determine the proper analytical method and sample preservation for required detection levels and matrix.
- Receipt of samples and maintenance of chain of custody.
- Screening of samples for radioactive and chemical hazards prior to transportation.
- Distribution of samples to internal and external labs.
- Development of new or modification of existing methods when required by matrix or detection limits.
- Analysis of chemical and radiochemical environmental samples.
- Validation of results.
- Archival and disposal of samples.
- Maintenance of QA/QC plans, procedures, and records to document the quality of the data process.

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transport of samples (pH/normality, flashpoint, and radiation screening), contracting for analyses to outside laboratories, QA/QC, and data validation.

The Laboratory Operations Group is responsible for chemical and radiological measurements associated with waste, wastewater, and environmental samples. CES performs analyses of waste streams for LLNL waste generators, programs, and facilities and high-sensitivity radiochemical analyses of environmental monitoring samples.

CES Laboratories and Analyses

Support to EPD

Methods and procedures approved by the U.S. EPA, DHS, LLNL, and DOE are used to characterize materials ranging in complexity from simple aqueous waste to unique items, such as HEPA filters contaminated with radioactive and hazardous chemicals. Methods used for radiochemical environmental monitoring, developed at LLNL, exceed EPA method requirements. CES performs or procures chemical and radiochemical analyses on:

- Hazardous and categorical process waste.
- Construction/demolition debris.
- Effluent (on-site retention tanks as well as sewer outflow).
- Swipes.
- Air samples (filters, air moisture).
- Surface, rain, and ground waters.
- Soil and sediment.
- Biota.
- Foodstuffs.

CES performs DHS-certified analyses for organic compounds, inorganic species and elements, and radioisotopes. Typical analyses performed by CES are listed in the table on page 7-5.

Outside Commercial Laboratories

CES maintains contracts (through EPD) with outside commercial analytical laboratories for additional analyses required for sample characterization, but for which the demand or cost-benefit ratio is insufficient to justify maintenance of capabilities in-house. Analysis for species such as cyanide, semivolatile organics, and dioxins are examples of some of the additional capabilities available through CES contracts with outside laboratories.

Support to Other LLNL Groups

CES lends expertise to other groups within LLNL by:

- Assuring sample quality and integrity by providing analytical advice and verification of generator knowledge of the composition of waste streams.

- Screening samples for radioactivity prior to identification of unknowns, and assisting in the identification of unknowns for disposal.

- Coordinating with external commercial laboratories and C&MS analytical laboratories to provide services not supported in the internal CES laboratories.

- Screening, packaging, and shipping LLNL samples to ensure compliance with Department of Transportation and DOE regulations.

- Providing technical guidance in a variety of areas, including but not limited to selection of analytical tests, development or application of QA/QC protocols, and auditing contract analytical laboratories.

CES Contacts

If you have questions about samples or CES services, contact CES Customer Service. You will be asked to provide a valid LLNL cost account number for any work that is not covered by CES institutional (overhead) funding.

Analyses for which CES maintains DHS certification. CES is certified to provide analyses for compounds in wastewater and hazardous materials, as well as environmental media.

Analysis	Analytes	Technique
Physical properties/characteristics		
EPA 1010	Ignitability	Flashpoint
EPA 9040	pH	pH meter
State of CA TPH	Total petroleum hydrocarbons	GC
Trace metals		
EPA 200.7	Sb, As, Ba, Be, Cd, Cr, Co, Cu, Pb, Hg, Mo, Ni, Se, Ag, Tl, V, Zn and Al, Au, Fe, Mn, Sr, Sn, Ti	ICP-ES
EPA 1311 (TCLP)	Metals and volatile extracts	Extraction
EPA 6010	Sb, As, Ba, Be, Cd, Cr, Co, Cu, Pb, Hg, K, Mo, Ni, Se, Ag, Tl, V, Zn	ICP-ES
EPA 7470	Hg	CVAAS
State of CA 66262.100 (STLC)	Metals	Extraction
EPA or State of CA	Other metals and inorganics as requested	ICP-ES
Organic compounds		
EPA 8010/8020 (also EPA 601/602)	Volatile chlorinated/non-chlorinated and aromatic compounds	GC
EPA 8015	Non-halogenated volatile organic compounds	GC
EPA 8260 (also EPA 624)	Volatile organic compounds	GC/MS
Radiochemical measurements		
State of CA certified methods	Gross α, β	Gas proportional counting
	Tritium	Liquid scintillation, noble gas MS
	γ–emitting nuclides	HPGe γ spectroscopy
	Field γ spectroscopy for γ-emitting nuclides	Portable HPGe or NaI spectroscopy
	Specific nuclides, U, Pu, Ra (Am, Np, Th, and others on request)	ICP-MS, α or γ spectroscopy, liquid scintillation (as appropriate)

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